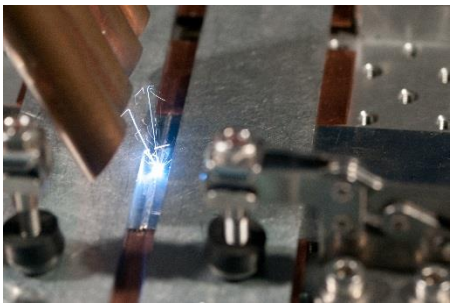
Innovations enabled by laser joining of dissimilar materials

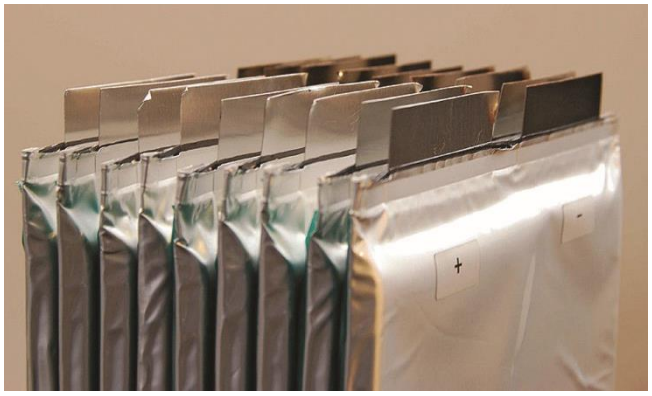
Prof. Dr.-Ing. Peter Plapper; Université du Luxembourg

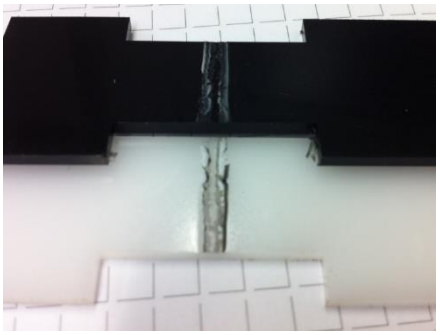
Manufacturing operations continuously strive to improve processes, enhance automation and thus maintain their competitive advantage. The capability to produce innovative mechatronic products requires groundbreaking technological know-how, which is usually based on a comprehensive scientific understanding of the underlying technology. These insights are the basis for successful automation, robust process control and finally world class quality of mechatronic products.



The key-note will present latest scientific findings of the Laser Technology Competence Center (LTCC) of the University of Luxembourg and illustrate them with real use cases.

A main hindrance for further advances in process automation for the exploding automotive electro-mobility market is the joining technology of Li-Jon batteries. The reliable joining process of the Cu-Al tabs requires exact control of irradiated laser density, which allows to control the growth of intermetallic phases in the joint. This yields better mechanical properties, reduced resistance and delayed ageing of the connection. In a similar vein, welding of welding Copper to Aluminum in electronic circuits can benefit from this process know-how.





Light weight structures composed of metal and polymers enable a large variety of innovative products. They can be automatically welded by spatial and temporal control of laser beam energy. The pure physio-chemical bonding of metal and polymers eliminates mechanical locking features and enables miniaturized joint geometries of mechatronic products.

To enhance the mechanical strength between sintered materials and mild steel, the energy density impact the metallurgical behavior. Its comprehensive understanding will enable to automate manufacturing of unprecedented product features.